XXIII. *On the Homopterous genus* Pyrops, *with descriptions of two new species.* By William L. Distant, F.E.S.

[Read November 8th, 1893.]

The genus *Pyrops* was founded by Spinola in 1839 (Ann. Soc. Ent. Fr., viii., p. 231), but the type must be sought in the description of his 2nd Division (p. 235), and in the *P. tenebrosus*, Fabr. To those who maintain that the first described or enumerated species of a genus is to be taken as the type of that genus, it would appear that a new generic name is required, for the first species cited is the *Fulgora candelaria*, Linn., which is undoubtedly not a *Pyrops* in the sense universally used. However, all homopterists have followed Spinola's second division as typical, and no useful end would be served in disturbing the arrangement. From this division, however, must be eliminated the *Fulgora obscurata*, Fabr., from Australia, which Stål has placed in his genus *Eurystheus* (Hem. Fabr., ii., p. 115), and the *Fulgora annularis*, Oliv., from Central America, which belongs to the genus *Diareusa*, Walk.

Pyrops is allied to *Fulgora*, and, like that genus, has many points in common. Thus in both, though the specific characters are to be sought in the length and structure of the cephalic process, secondary characters to group the species are found in the colour of the wings, and in *Pyrops* in the colour of the abdomen.

Fulgora is confined to the Oriental region, but *Pyrops* belongs not only to that, but also to the Ethiopian region, in the last of which are alone found the black-winged species; whilst those with white wings are distributed throughout the whole area of the genus.

Having two undescribed species of this somewhat scarce genus in my collection, and possessing most of the other species, I have thought that a generic revision and enumeration might with advantage be given, and such I now present to the Society.

A. *Species with black wings.*

P. tenebrosus, Fabr.
P. flammeus, Linn.
P. natalensis, n. sp.
P. madagascariensis, Sign.

B. *Species with fuscous wings, hyaline towards base.*

P. clavaticeps, Karsch.

C. *Species with greyish wings, fuscous towards base.*

P. pustulosus, Gerst.

D. *Species with white wings.*

a. *Abdomen alone fulvous.*

P. nobilis, Westw.
P. perpusilla, Walk.
P. mustellinus, Dist.
P. dohrni, Stål.

aa. *Abdomen alone fuscous or black.*

P. servillei, Spin.
P. javanensis, Dist.
P. affinis, Westw.
P. chinensis, n. sp.
P. marginatus, Westw.
P. intricatus, Walk.
P. albipennis, Spin.

Species little known or imperfectly described.

P. punctatus, Oliv.
P. cognatus, Westw.

1. *Pyrops tenebrosus.*

Fulgora tenebrosa, Fabr., Syst. Ent., p. 674, 8 (1775); Sp. Ins., ii., p. 314, 9 (1781); Mant. Ins., ii., p. 260, 9 (1787); Ent. Syst., iv., p. 3, 9 (1794); Syst. Rhyng., p. 3, 9 (1803); Oliv., Enc. Méth., vi., p. 568, 7 (1791); Burm., Gen. Ins., subg. *Pyrops*, f. 1 (1846); Westw., Trans. Linn. Soc., xviii., p. 142, 14 (1851).

Fulgora africana, Pal. Beauv., Ins., p. 168, Hém., t. 19, f. 3 (1805).

Flata tenebrosa, Germ., Mag. Ent., iii., p. 189, 2 (1818); Thon., Ent. Arch., ii., 2, p. 47, 5 (1830).
Pyrops tenebrosa, Spin., Ann. Ent., viii., p. 235, 3 (1839); A. & S. Hist. des Hém., p. 492, 1 (1843); Walk. (part), List. Hom., ii., p. 268, 2 (1851).
Pyrops tenebrosus, Stål, Hem. Afr., iv., p. 140, 1 (1866); Gerst (part), in Decken, Reise, 3, 2, p. 426, 63 (1873).

Hab. West Africa: Senegal, Sierra Leone (Stål). East Africa: Zanzibar (coll. Dist.), Delagoa Bay (S. Afr. Mus. and coll. Dist.).

2. *Pyrops flammeus.*

Cicada flammea, Linn., Cent. Ins., var., p. 16, 39 (1763).
Fulgora flammea, Linn., Syst. Nat., ed. xii., 1, 2, p. 704, 7 (1767); Fabr., Syst. Ent., p. 674, 7 (1775); Spec. Ins., ii., p. 314, 8 (1781); Mant. Ins., ii., p. 260, 8 (1787); Ent. Syst., iv., p. 3, 8 (1794); Syst. Rhyng., p. 3, 8 (1803); Westw., Trans. Linn. Soc., xviii., p. 143, 15 (1851).
Cicada laternaria fusca, deGeer, Mém., iii., p. 200, 3, t. 32, f. 1 (1773).
Pyrops flammeus, Stål, Hem. Afr., iv., p. 141, 3 (1866).

Hab. West Africa: Isubu, Angola (coll. Dist.).

This species is differentiated from *P. tenebrosus* by its much shorter cephalic process. Its precise habitat was unknown to Stål, who redescribed the unlocalised specimen in deGeer's collection.

3. *Pyrops madagascariensis.*

Pyrops madagascariensis, Sign., Ann. Soc. Ent. Fr., ser. 3, vol. viii., p. 183, 15 (1860); Stål, Hem. Afr., iv., p. 140, 2 (1866).

Hab. Madagascar (coll. Sign.); Ins. Anjoana (Stål).

Of this species Stål remarks: "*P. tenebroso* maxime affinis, processu capitis apice quam prope apicem haud magis compresso, sed lateribus ante medium parallelis instructo divergit; au distinctus?" Subsequently Signoret (Ann. Soc. Ent. Fr., ser. 6, vol. vi., p. 27 (1886)), in

recording his *P. madagascariensis*, remarks: "Nous voyons si peu de différence avec le *Pyrops tenebrosus*, F., que nous croyons que ce n'est qu'une variété; nous en dirons autant du *flammea*, Lin."

I have not been able to examine a specimen of *P. madagascariensis*, but should presume it to be a distinct species from the differential structural characters of the cephalic process, as given by Stål (supra), while Signoret as certainly did not possess the typical Linnean species.

4. *Pyrops natalensis*, n. sp.

Head, thorax, tegmina, and legs luteous, slightly tinged with testaceous; cephalic process irregularly spotted with black, and with a central elongate ochraceous spot at base; thorax thickly and finely spotted with black, the lateral angles and apex of the mesonotum impunctate; tegmina obscurely and finely spotted with black, the spots most distinct and prominent on costal and apical areas, which are also paler in hue; wings pitchy black; abdomen black, above with the posterior segmental margins brownish, beneath with oblique marginal ochraceous spots; legs irregularly spotted with black. Cephalic process long and robust, coarsely rugose, with three prominent longitudinal narrow waved carinæ above, and two beneath, the others merged and tessellate, the apex obliquely and concavely truncate. Long. from eyes to apex of abdomen, 28 millim.; cephalic process from eyes to apex, 18 millim.; exp. tegm. 85 milim.

Hab. Natal; Durban (coll. Dist.).

A species to be differentiated from the other black-winged Ethiopian species by the length and rugosity of the cephalic process.

5. *Pyrops clavaticeps.*

Pyrops clavaticeps, Karsch, Berl. Ent. Zeit., xxxv., p. 62, t. 11, f. 4 (1890).

Hab. West Africa: Loango. East Africa: Zanzibar (Karsch).

6. *Pyrops pustulosus.*

Pyrops pustulosus, Gerst, in Decken Reise, 3, 2, p. 427, 64, t. xvii., f. 9 (1873).

Hab. East Africa: Zanzibar (Gerst.).

7. *Pyrops nobilis.*

Fulgora nobilis, Westw., Trans. Linn. Soc., xviii., p. 146, t. 12, f. 10 (1841).

Pyrops nobilis, Walk. (excl. syn.), List. Hom., ii., p. 268, 1 (1851); Journ. Linn. Soc., Zool., 1867; Atkins, J. A. S. Beng., vol. lv., pt. ii., No. 1, p. 200, 116 (1886).

Hab. Malay Peninsula: Malacca (Westw.), Perak (coll. Dist.). Malay Archipelago: Sumatra (Brit. Mus. and coll. Dist.), Borneo, Kina Balu Mt. (coll. Dist.).

8. *Pyrops perpusilla.*

Pyrops perpusilla, Walk., List. Hom., ii., p. 269, 7 (1851); Atkins, J. A. S. Beng., vol. liv., pt. ii., n. 3, p. 140, 23 (1885).

Hab. Continental India: North Bengal (Brit. Mus.), Naga Hills (coll. Dist.).

9. *Pyrops mustellinus.*

Pyrops mustellinus, Dist., Ann. & Mag. Nat. Hist., ser. 5, vol. xii., p. 243 (1883).

Hab. Java (coll. Dist.).

10. *Pyrops dohrni.*

Pyrops dohrni, Stål, Ofv. Vet.-Ak. Förh., 1858, p. 449.

Hab. Ceylon (Stål).

Mr. Kirby, in his much controverted paper on Ceylonese Rhynchota (Journ. Linn. Soc., Zool., vol. xxiv., p. 133 (1891)), records this species as a synonym of the *P. affinis*, Westw. This is the more singular, as Stål, besides other differences, distinctly describes the different colour of the abdomen, "Abdomine sordide flavo-testaceo, haud nigro."

11. *Pyrops servillei.*

Pyrops servillei, Spin., Ann. Soc. Ent. Fr., viii., p. 237, 6, t. 2, f. 1 (1839).

Hab. Java (Spin.).

Walker (List. Hom., ii., p. 268 (1851)) records this species as a synonym of *P. nobilis*, Westw. It is to be noted that Walker, who so frequently described the same

species several times over, is equally to be dreaded when he writes synthetically.

12. *Pyrops javanensis.*

Pyrops javanensis, Dist., Ann. & Mag. Nat. Hist., ser. 5, vol. xii., p. 242 (1883).

Hab. Java (coll. Dist.).

13. *Pyrops affinis.*

Fulgora affinis, Westw., Trans. Linn. Soc., xviii, p. 144, t. 12, f. 6 (1841).

Pyrops punctata, Walk. (part), List. Hom., ii., p. 268, 3 (1851); Atkins (part), J. A. S. Beng., vol. liv., pt. ii., n. 3, p. 140, 22 (1885).

Pyrops affinis, Kirby (part), Journ. Linn. Soc., Zool., vol. xxiv., p. 133 (1891).

Hab. Continental India: Nepaul, Silhet (Brit. Mus.), Sikkim (Calc. Mus.), Naga Hills (coll. Dist.), Ceylon (Brit. Mus.). Malay Archipelago: Java (Brit. Mus.). China: Hong Kong (Brit. Mus.).

Mr. Atkinson followed Walker in placing this species as a synonym of *P. punctata*, Oliv., which was founded on a figure given by Stoll of an insect he recorded from Guinea. Though Stoll's habitats are not always without doubt, neither is his figure in this instance capable of being applied to the Indian species of Westwood.

14. *Pyrops chinensis*, n. sp.

Head, thorax, tegmina, and legs sordidly greyish, slightly tinged with ochraceous; cephalic process with a few black spots, more numerous at base, its apical margin ochraceous; thorax somewhat thickly spotted with black; tegmina thickly spotted with black, the spots slightly larger and more prominent at anterior and apical areas, the venation ochraceous; wings lacteous; abdomen black, more or less tinged with cretaceous, the posterior segmental margins obscurely brownish; legs prominently and irregularly spotted with black. Cephalic process about as long as the abdomen, its apex obliquely truncate and moderately excavated; its surface marked with eight narrow longitudinal carinæ, some of which are much waved, and become obscure towards base. Long. from eyes to apex of abdomen, 19 millim.; cephalic process from eyes to apex, 14 millim.; exp. tegm. 60 to 65 millim.

Hab. China: Chia-Hou-Ho, 1700 ft.

For the possession of this species I am indebted to J. H. Leech, Esq., and it was obtained during Mr. Pratt's expedition.

15. *Pyrops marginatus.*

Fulgora marginata, Westw., Trans. Linn. Soc., vol. xviii., p. 144, 17 (1841).

Hab. S. Africa: Cape of Good Hope (Oxford and Brit. Mus.), Cape Colony (coll Dist.).

16. *Pyrops intricatus.*

Pyrops intricatus, Walk., List. Hom., Suppl., p. 43 (1858).

Hab. S. Africa: Natal, Durban (Brit. Mus. and coll. Dist.).

17. *Pyrops albipennis.*

Pyrops albipennis, Spin., Ann. Soc. Ent. Fr., viii., p. 238, 7 (1839); Stål, Hem. Afr., iv., p. 141, 4 (1866).

Hab. West Africa: Senegal (Stål), Guinea (Spin.).

Species little known and of doubtful habitat.

Pyrops punctatus.

Fulgora punctata, Oliv., Enc. Meth., vi., p. 569, 8 (1791); Gray, Griffith An. King, t. 138, f. 2, a, c (1832); Westw., Trans. Linn. Soc., xviii., p. 143, 16 (1841).

Flata punctata, Germ., Thon's Archiv., ii. (2), p. 47 (1830).

Pyrops punctata, Walk. (part), List. Hom., ii., p. 268 (1851); Schaum, Peters, Reise Ins., p. 51 (1862); Atkins. (part), J. A. S. Beng., vol. liv., pt. ii., n. 3, p. 140, 22 (1885); Stoll, Cig., f. 28.

Hab. Guinea?.

Pyrops cognatus.

Fulgora cognata, Westw., Trans. Linn. Soc., vol. xviii., p. 145, 19 (1841).

Hab.——?.

XXIV. *On the sexes of larvæ emerging from the successively laid eggs of* Smerinthus populi.

By Edward B. Poulton, M.A., F.R.S., F.L.S., &c., Hope Professor of Zoology in the University of Oxford.

[Read November 8th, 1893.]

My friend and former pupil, Mr. R. C. L. Perkins, once told me that he had sometimes noticed that a pair of *Sphinx* larvæ found in the same stage of growth, in close proximity upon the same tree, and presumably hatched from a pair of eggs laid by the same parent, produce moths of different sexes. He inferred that this arrangement facilitated pairing, and he was led to wonder whether there is a regular alternation of sex in the successive offspring.

On the other hand, it appeared quite possible that the cases which he had observed were exceptional, and that the succession is irregular, or that it is such as to facilitate intercrossing rather than frequent pairing between closely related individuals. This latter view is suggested as a probable one by the numerous adaptations by which wide intercrossing is favoured in other departments of organic nature, and by the following direct evidence. Mr. W. Hatchett Jackson and Mr. O. H. Latter have observed that the pupæ obtained from different batches of larvæ of *Vanessa io* "were principally, but not entirely, of one or of the other sex."* It is generally admitted that the separate colonies of *Vanessa* larvæ are, at any rate as a rule, hatched from different batches of eggs. Such an observation, if confirmed, is to be interpreted by one of two suppositions. We must either suppose that the whole mass of eggs of each female *Vanessa* produces a great preponderance of one and the same sex (males in some individuals and females in others), or that different batches of eggs laid

* Trans. Linn. Soc. Lond., vol. v., 1890, p. 156.

by the same individual produce now a preponderance of one sex, and now of another. Either of these alternatives would appear strongly to favour intercrossing. The following observations, so far as they go, tend to support the latter alternative.

A pair of *Smerinthus populi* were found *in coitu* in an Oxford garden, between 10 and 11 a.m., on May 25th, 1893. They were carefully removed, and remained together until 8.40 p.m. The attempt was made to observe the order in which the eggs were laid, and to rear the larvæ separately, the sexes being determined in the pupal state. The results are most concisely shown in a tabular statement.

Date.	Number and order of eggs laid.	Sexes produced. M = male; F = female.	Observations.
May 25.	44 eggs laid, order unnoted.	15 M 28 F	1 missing (unknown whether the egg hatched). 1 male and 1 female moth emerged in the hot summer of 1893. 1 male pupa was deformed and dead.
May 26.	47 eggs laid.	——	All these eggs, the order of which had been carefully noted, hatched during my absence from home, and the larvæ were lost.
May 27.	34 eggs laid. The order of the first 22 unnoted.	9 M 8 F	4 missing; 1 larva died. 1 female moth emerged 1893. 1 male pupa was deformed and dead, and another rather deformed.
	23	——	Larva died small (probably 3rd stage).
	24	.. .. M	Pupa rather deformed.
	25	.. .. F	
	26	.. .. M	
	27	.. .. M	
	28	.. .. M	
	29	.. .. M	
	30	.. .. M	
	31	.. .. F	
	32	.. .. F	
	33	.. .. M	
	34	.. .. M	Moth emerged 1893.
		Total 17 M, 11 F	

Date.	Number and order of eggs laid.	Sexes produced. M = male; F = female.	Observations.
May 28.	28 eggs laid, order shown below.		
	1	.. .. F ..	Moth emerged 1893.
	2	.. .. F	
	3	.. .. F	
	4	.. ..	Larva died in 3rd or 4th stage, owing to accident to branch of food-plant.
	5	.. .. M	
	6	.. .. F	
	7	.. .. F	
	8	.. ..	Larva died in 3rd or 4th stage.
	9	.. .. M	
	10	.. .. F	
	11	.. .. M	
	12	.. .. M	
	13	.. .. M	
	14	.. .. M	
	15	.. .. F	
	16	.. .. M	
	17	.. .. M	
	18	.. .. F	
	19	.. .. M	
	20	.. .. M	
	21	.. .. F	
	22	.. .. M	
	23	.. .. F	
	24	.. .. F	
	25	.. .. F	
	26	.. .. F	
	27	.. .. M	
	28	.. .. M	
		Total 13 M, 13 F	
May 29.	8 eggs laid, order unnoted.	4 M 2 F	1 missing; 1 larva died. 1 male moth emerged 1893. 1 male pupa dead and deformed, and 1 very small and rather deformed.
May 30.	14 eggs laid. order unnoted.	7 M 4 F	3 larvæ died.
May 31.	7 eggs laid, order unnoted.	1 M 6 F	
June 1.	3 eggs laid, order unnoted.	1 M 1 F	1 egg did not hatch.

Date.	Number and order of eggs laid.	Sexes produced. M = male; F = female.	Observations.
June 2.	7 eggs laid, order shown below.		
	1	.. .. F	
	2	.. .. M	
	3	.. .. F	
	4	.. .. F	
	5	.. ..	Larva hatched, but died very small.
	6	.. ..	Did not hatch. Probably no development took place; egg blackened.
	7	.. ..	Ditto. ditto.
		Total 1 M, 3 F	
June 3.	1 egg laid.	——	Larva did not hatch, but was apparently fully formed in the egg.

The total number of eggs laid on each successive day forms an interesting curve rising to a maximum on the second day and declining very rapidly on the fifth.

The most striking result shown in these tables is the remarkable change in the proportion of the sexes on different days. Thus on May 25th there were nearly twice as many females as males, on May 27th over 50 per cent. more males, while on May 28th the numbers were equal. It is possible that this change in proportion may follow some biological law, especially when considered in connection with Mr. Jackson's and Mr. Latter's above-mentioned observations. It is at any rate enough to suggest further observation. At present, however, as I learn from Mr. Francis Galton, to whom I have submitted the figures, the numbers are not large enough to warrant any such conclusion.

With regard to the succession of the sexes in a series of individuals (May 27th, 28th, and June 2nd), the arrangement does not appear to differ from that of black and white balls drawn successively out of a bag containing equal numbers of each. But here, too, wider observations are required. The arrangement in little groups of the same sex *may* possibly be adapted to favour cross-fertilisation. But even in drawing pairs of

black and white balls, two of the same colour will be drawn together twice as frequently as those of different colours. In future observations of a sluggish species like *Smerinthus populi*, it would be desirable to track the moth as it lays little groups of eggs on different leaves, and to rear such groups separately. We must not altogether put aside the remote possibility that the parent may possess some power of controlling the sex of her offspring.

Six moths emerged in the hot summer of 1893 ; three of these were males and three females. The eggs from which these individuals were hatched were scattered through the successional series, and were not peculiar to any part of it, and the same appears to be true of the deaths of larvæ and deformity of pupæ.

Failures to hatch, however, are confined to the end of the series, unless some of the "missing" larvæ are to be explained in this way. This tendency is especially clearly seen on the last two days, and yet the very last egg laid contained a well-formed larva which was unable to hatch.

Even the small number of larval deaths which took place are chiefly to be accounted for by the conditions of the experiment. Thus, considering only the eggs laid during May (and omitting the later eggs because of the frequent failure to hatch), we find out of 40 larvæ reared in separate sleeves (23 to 34 on May 27th, and the 28 on May 28th) only two deaths occurred, not including the manifestly accidental death of the fourth larva on May 28th. On the other hand, out of 95 larvæ reared in groups of from 3 to 8 (usually 7) in number, 11 larvæ died or were missing. From this it may be inferred that larvæ are in some way injured by being reared in groups with a much greater relative proximity than in nature. I have also found this to be true of *S. ocellatus ;* for, when groups of more than 10 or 12 small larvæ were enclosed in sleeves of moderate size, it was always found that the numbers became reduced to a maximum of about a dozen, and often much lower ; whereas groups of smaller numbers were frequently maintained without any deaths.

The list as a whole strongly impresses upon us the comparative rarity of death from internal causes (including disease), and the overwhelming importance of

the struggle with highly organised enemies in determining the vast amount of destruction which occurs among these animals in the natural state.

The unfortunate loss of the 47 larvæ of May 26th served to show that the period of development within the egg is extremely uniform. The eggs laid on May 25th had been properly enclosed, and I thought I was safe in leaving the others for a day. On my return every one of the eggs laid on the 26th had hatched, and the larvæ had escaped; while not a single larva had emerged from any egg laid at a later date.

Six of the male pupæ were deformed, but not one of the females.

The total number of eggs laid was 193, and subsequent dissection revealed a single egg in the body of the parent moth. From these eggs 68 female and 59 male pupæ were obtained.

The results afford no support to the opinion that the sex of insects can be determined by external conditions during larval life. With conditions of very complete uniformity, the proportions of the sexes—68 females to 59 males—appear to be normal. It may be admitted that the larger female larvæ require more food, chiefly to prepare for the amount of material to be stored up in the ova. It would not therefore be at all surprising if the female larvæ were starved before the males when a minimum of food was supplied. The consequent emergence of a number of males would in no way support the view that a scanty diet "determines" this sex. It is probable that some writers on this subject have mistaken *favouring* for *determining* conditions.

There was no tendency towards the predominance of males in the last-laid eggs, and therefore no indication that this sex may be determined by exhaustion (in itself most improbable) of the spermatozoa.

XXV. *A revision of the genus* Œneis. By Henry John Elwes, F.L.S., F.Z.S., President of the Entomological Society of London, and James Edwards, F.E.S.*

[Read November 8th, 1893.]

Plate XV.

In accordance with the practice of the majority of European lepidopterists, we apply the name of *Œneis*, Hübner, to the group of insects here treated of, instead of *Chionobas*, Bdv., although it is quite clear that the former is a mere catalogue name. As W. H. Edwards says, in the 'Canadian Entomologist,' vol. xxi., p. 63, note:—"Perhaps the definition of the genus *Œneis* (and a definition is indispensable to recognition) was given by Mr. Scudder in 'Systematic Revision of the American Butterflies,' 1872; but *Chionobas*, Boisduval, 1832, has the priority."

The genus, by whichever name it is called, may well be regarded as an Arctic development of *Satyrus*, from which, however, all its members differ in the following particulars:—The costal vein only is inflated at the base; the antennæ are gradually widened to the apex, and do not form a more or less abrupt club; the intermediate tibiæ are considerably more than half as long as their tarsi; and the fore wing, especially in the males of the more typical species, has a characteristic pointed appearance, owing to the comparatively short inner margin, and the cell is comparatively long and narrow. The species are yellow-brown or grey-brown above, with a more or less distinct pale submarginal band, which bears from one to five roundish black spots or ocelli; brown, with a more or less distinct submarginal row of fulvous spots; or unicolorous smoke-brown, and in the latter case the wings have a very abraded appearance.

In characterising this genus a point has been made of the hairiness of the under side, *i. e.*, of the legs and hind

* For statements appearing in the first person singular I am alone responsible.—H. J. Elwes.

wings; but they are equalled in this respect by some species of *Satyrus*, *S. hermione*, for example.

The following types of clasp-form are found in this genus; in *norna* and *jutta* there is an unusual amount of individual variation, but the differences are merely those of degree, and are not, in the most extreme cases, sufficient to obscure the relationship of the species :—

1. Clasp oblong, more or less pointed at the apex, its upper edge bearing a single tooth or projection somewhere between the middle and the base.
   ex. *chryxus*, *bore*, *taygete* (figs. 3, 10).
2. Clasp rather broadly triangular, and wanting the projection on the upper edge . . . . ex. *urda*, *uhleri* (fig. 1).
3. Clasp oblong, gradually narrowed; apex bluntly rounded or subtruncate; serrulation of the upper edge inconspicuous or absent . . . . . ex. *hora*, *walkyria* (fig. 7).
4. Clasp not curving inwardly at the apex, which is bluntly rounded, and, together with the upper edge nearly or quite to the middle, bears unequal and comparatively large teeth.
   semidea, *jutta*, *fulla* (figs. 5, 9).
5. Clasp rather suddenly narrowed about the middle, strongly curved inwards at the apex; the teeth decumbent and almost confined to the upper apical angle, which is somewhat produced.
   ex. *subhyalina*, *brucei*, *norna* (figs. 6, 13).

Œneis appears to be the most cold-enduring of all known genera of butterflies. With the exception of the aberrant *nevadensis* group there is not one species inhabiting a region in which the winters are not very long and severe, and usually of an Arctic character. About half the species are confined to high mountain regions, where they frequent stony and rocky ground above timber-line; another section, like *uhleri* and *alberta*, inhabit grassy steppes and prairies; a third, like *bore* and *subhyalina*, occur on the coasts of Arctic seas; and a few, such as *chryxus* and *nevadensis*, are inhabitants of mountain forests. Their larvæ, so far as known, are all grass-feeders, but most of them are unknown. Their geographical distribution is, if we except the almost unknown *Œ. antarcticus* from Patagonia, strictly confined to the Palæarctic region, in which I include, so far as Rhopalocera are concerned, the Nearctic region of Sclater.

As will be seen from the references below, the literature of the group is somewhat extensive; but it is for the

most part too scattered and fragmentary to be readily utilised by the student of to-day.

We have excluded the following species from our arrangement of the genus :—

Chionobas stretchii, W. H. Edw. (Trans. Am. Ent. Soc., iii., p. 192, 1870), which is the same as the *Hipparchia ridingsii* of the same author (Proc. Ent. Soc. Phil., iv., p. 201, 1865), and is figured by Strecker (Lep., pl. iv., fig. 6, ♀, 1873), is perhaps best treated as an aberrant *Œneis*, since the balance of its characters seem to be rather with that genus than with *Satyrus*. It has the antennæ and something of the facies of an *Œneis*, but the cell of the fore wing is comparatively wider, the lower surface of the hind wing wants the long upright hair, the intermediate tibiæ in the male are about half as long as the tarsi, and there seems to be a very feeble thickening of the basal portion of the median vein ; but it has not the facies, the strongly clubbed antennæ, or the swollen base of the median vein found in typical *Satyrus*. It is true that its divergence both from *Œneis* and *Satyrus* is as great as that of some other genera of *Satyridæ* from each other ; but if a separate generic name is required for it, that of *Neominois* has been provided by Scudder (Bulletin Buffalo Soc. Nat. Sci., ii., p. 241, 1875).

Chionobas pumilus, Feld., Reise Novara, Lep., iii., p. 490, pl. lxix., figs. 6, 7, 1866, ♂ ; *ib.*, Elwes, P. Z. S., 1882, p. 404, pl. xxv., fig. 3 ; *Œneis pumilus*, Marsh. and de Nicé., Butt. Ind., i., p. 238, pl. xv., fig. 37, ♂ ; *Œneis?* (*Satyrus?*) *palearcticus*, Stgr., Stett. Ent. Zeit., 1889, p. 20 ; *Œneis pumilus* var. *lama*, Alphéraky, Rom. Mem. sur Lép., v., p. 80, 1889 ; *Œneis pumilus* var. *iole*, Leech, Butt. China, &c., p. 76, pl. xi., fig. 2, is unquestionably an *Aulocera*, Butl. (Ent. Mo. Mag., iv., p. 121). It possesses the peculiar wing-pattern and other characters proper to that genus, and, moreover, has the same type of clasp-form which is found in at least one species of *Aulocera*, and which is perhaps correlated to the wing-pattern found in that genus. Its superficial resemblance to *Aulocera brahminus* had already been remarked upon by Marshall and de Nicéville and Leech (*l. c.*). The type of this species was described from Ladak, where it is common on the dry plateaus at from 14,000 to 16,000 ft. I afterwards got specimens from the alpine valley of